ENTOMOLOGY.

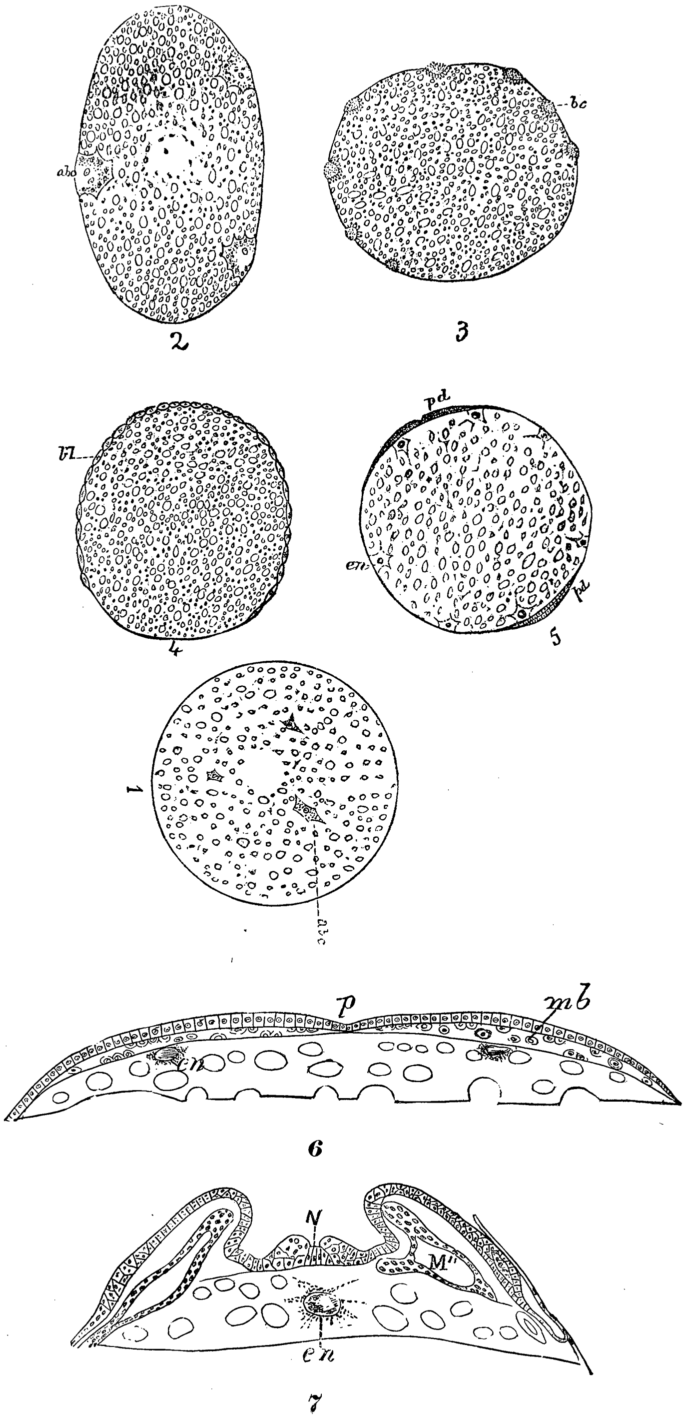
Development of the Mole Cricket.—A. Korotneff has published in the Zeitschrift für wissen. Zoologie, XLI, 4, 570, a well illustrated essay on the embryology of the mole cricket, which has been also noticed by C. Emery in the Biologisches Centralblatt for Jan. 15, in connection with Grassi's observations on the development of the honey bee. The egg of the mole cricket has an abundant yolk, while that of the bee has little yolk and is small and transparent. Yet both observers have independently arrived at the same results in four important points. It is noteworthy that in both forms before the formation of the blastoderm a stage was observed in which the amœboid embryonal cells seemed to possess no clear nuclei. With this result might be connected the relation briefly described by A. Sommer in the case of a Podurid, when the ripe egg was entirely without a nucleus. Whether there was in all these cases a genuine absence of the nucleus, or a diffuse nucleus form, such as Graber discovered in the Protozoa, is still to be determined, and would not be without interest in connection with the late reflections of Weismann and others on heredity.

In Gryllotalpa the embryonic cells are at first scattered over the surface of the egg; some migrating into the deeper parts of the yolk and forming the yolk cells regarded by Korotneff as the primary mesoderm. From the ectoderm exclusively separates the endoderm. There first originate, under the ectoderm cells which Korotneff denotes as mesenchym, and not till later does the separation of the myoblasts follow along the ventral median line. Later still arise from the ectoderm near the tracheæ other groups of cells which are also to be considered as mesenchym, and which were also observed in Bombyx by Tichomiroff.

The embryonal membranes serosa and amnion arise as ectodermal folds. After the limbs are indicated the segments are formed. Korotneff enumerates eighteen segments, *i. e.*, four in the head, three in the thorax, ten abdominal and one tail-segment (Tichomiroff observed the same number in Bombyx. The nervous system primarily shows a corresponding organization in seventeen pairs of ganglia, which are reduced to thirteen by the consolidation of the three hinder head-ganglia (in the text they are erroneously called thoracic ganglia) and the three last abdominal ganglia. The cerebral ganglia are first separated from each other and only joined to the ventral chain by slender commissures. The structure called "chorda" by Nusbaum is a median ectodermal one, which grows in between the two series of ganglia, and has nothing at all to do with the formation of the connective tissue of the nervous system. This last tissue must arise from the immigrating blood-cells.

Especially interesting are the observations on the structure of

PLATE XVIII.



the entoderm and digestive canal. The cells of the primary entoderm (the yolk cells) undergo a radial division of the yolk, the yolk-pyramids thus arising melting into each other centrally. Some of the cells grow and form, under the serous membrane which has not yet disappeared, the dorsal wall of the body, and the dorsal plate or dorsal organ. Through the growth of the parts forming the lateral walls of the body, the dorsal organ gradually becomes covered, its cells sink into the yolk and seem to break into fragments. After the ectodermal parts of the digestive canal (fore and hind intestine) have formed, amœboid cells still migrate into the yolk, and seem to contribute to its fluidity (verflussigung). After hatching, the whole yolk by a pumping movement, gradually becomes, including whatever is contained in the same, partly degenerate cells, thus pushing the so-called primary entoderm into the portion of the fore-intestine, called the crop. The mesenteron receives no epithelial covering from the primary entoderm, and the epithelium of the mid-intestine, namely, the definite or secondary entoderm, arises from the mesoderm, according to Korotneff, through the wandering blood-cells. The morphological significance of the strange dorsal organ is, according to Korotneff, nothing else than a stopper which fills up the dorsal gap of the body-walls of the embryo. Physiologically the organ plays an important rôle in the manufacture of the yolk-mass destined for the nourishment of the embryo. In the digestion of the yolk, so to speak, three kinds of cells are active: 1, the yolk cells; 2, the dorsal organ; 3, immigrant blood corpuscles. By the above considerations the want of a dorsal organ in eggs with a scanty yolk is explained.

The formation of the heart is very fully described. We will only give the following abstract. Blood cells are early present almost everywhere between the yolk and mesoderm; the heart becomes indicated in the form of two furrows, which draw near to one another together with the dorsal edges of the myoblasts, and which unite in the heart-tube; each furrow borders a wide blood-lacuna which covers the dorsal side of the yolk and becomes reduced to the cavity of the heart.

EXPLANATION OF PLATES XVIII AND XIX.

LETTERING.

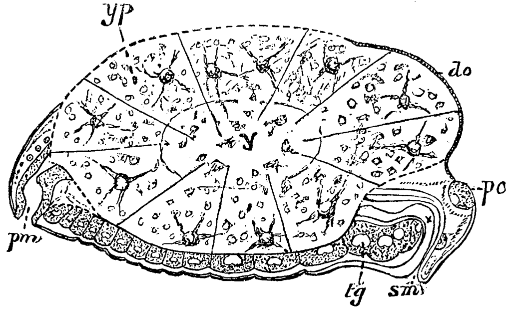
abc, amœboid blastodermic cells.
ant, antenna.
ar, arterial sinus.
bc, blastoderm cells.
bl, blastoderm.
bla, abdominal vesicles.
cr, proventriculus, or crop.
dm, ventral diaphragm.
do, dorsal organ.
dpm, dorsal diaphragm.
en, endodermal cells.
ent, enteric layer.
f, fat-body.
g, ventral ganglion.
H, *ht*, heart.
l, lacuna.
M′, cavity of the myoblast.
m, mouth.

mb, myoblast cells.
md, mandible.
men, mesenteron.
mx', 1st maxilla.
mx'', labium, or second maxilla.
ml, leaf-like portion of mesenteron.
N, nerve-furrow.
œ, œsophagus.
P, primitive groove.
pc, procerebrum.
pd, primitive disk.
pm, proctodæum.
sg, subœsophageal ganglion.
sm, stomodæum.
tg, thoracic ganglion.
vm, ventral muscle.
y, yolk.
yp, yolk-pyramids.
I, 1st pair of feet.
II, 2d " "
III, 3d " "

FIGURES.

FIG. 1.—Egg in which the amœboid (*abc*) nuclei are moving toward the surface.
" 2.— " " " " " have reached the surface, and show an active nucleus-formation.
" 3.—The blastodermic cells have no nucleus, and are placed at equal distance apart.
" 4.—The blastoderm cells now forming a continuous layer.
" 5.—Cross-section of the egg with blastodermic disk, also showing the disposition of the endodermal cells.
" 6.—Cross-section of the blastodermic disk, with the myoblast cells (*mb*) already formed.
" 7.—Cross-section through the thorax of the embryo; the body-cavity extended into the limbs.
" 8.—Longitudinal section of the embryo; the yolk-pyramids (*yp*) form a common inner yolk-mass (*y*).
" 9.—Section through the heart; *H*, cavity of the heart; the two halves of the heart-sinuses having united dorsally, ventrally they are still open and are bounded by the walls of the mesenteron.
" 10.—Cross-section of an embryo, showing the blood-lacunæ separated on the back by the dorsal organ (*do*); the intestinal fasciated layer (darmfaserblatt) has not completely enclosed the yolk.
" 11.—Embryo completely segmented, with the rudiments of the appendages, labrum (*lab*) and nervous ganglia (*pc–ng*).
" 12.—A more advanced embryo, showing the stomodæum (*st*) indicated as a frontal protuberance.
" 13.—Section through the recently hatched larva, showing the cells of the mesenteron or chyle-stomach, and the cellular layer on the front surface; also the proventriculus or crop.

DEVELOPMENT OF THE HONEY BEE.—An abstract of Grassi's observations appears in the Biol. Centralblatt, which we translate. The development of the honey bee is much more simple in some respects than that of the mole cricket because the necessary structures for the digestion of the food yolk are entirely lacking. Yolk cells exist after the formation of the one-layered blastoderm, but do not limit the cleavage of the yolk. The blastoderm is at first spread continuously over the whole egg, but afterwards becomes arrested upon the back. The mesoderm so arises from the ectoderm that a median ventral plate at the same time sinks in and becomes overgrown by the adjoining later parts. This plate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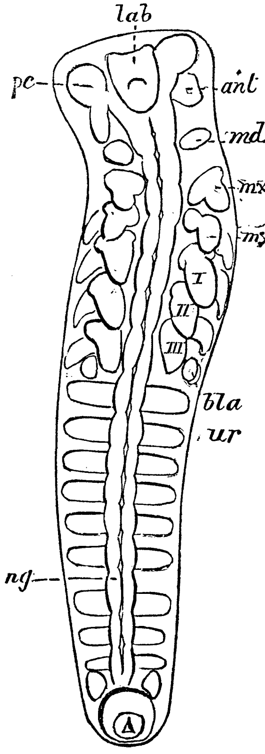
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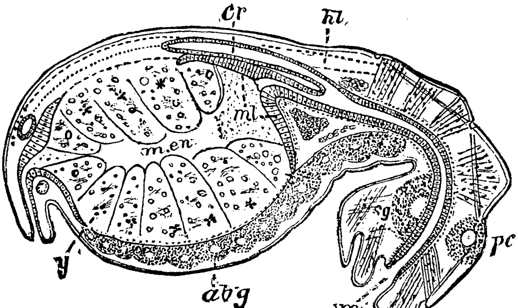
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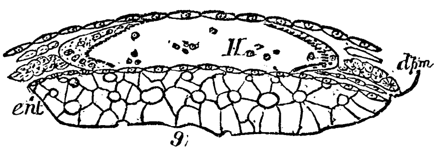
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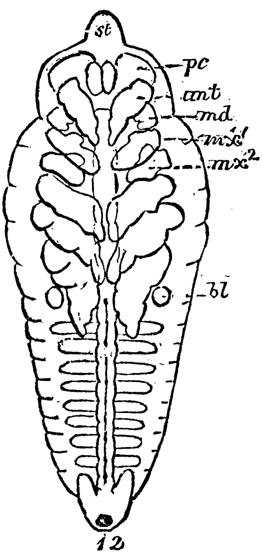
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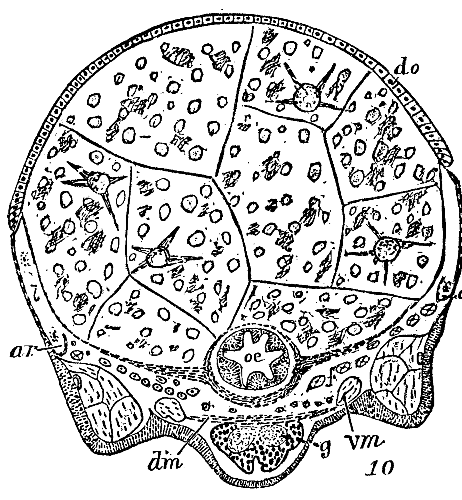
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is at first one-layered, and afterwards is composed of two layers, and then divides for the formation of the body-cavity. The posterior and anterior ends of the mesoderm-plate lengthen to form the mesoderm of the head and end of the abdomen. From these last portions of the mesoderm arises also the definite entoderm, viz., the epithelial covering of the mesenteron. The yolk cells thereupon disappear; according to Grassi the figures quoted from Tichomiroff as well as from O. and P. Hertwig, in regard to the proof of the origin of the endoderm in the yolk cells can also be explained to agree with his views. The amnion and serous membranes are not separated in the bee, but form a single layer of cells. Grassi is inclined to trace the embryonal membranes of insects phylogenetically from an especially modified dermal fold, which was inherited from the ancestors of the class; such a duplicature, suggests Emery, might be comparable to the mantle of many Entomostraca.

According to Grassi the cerebral ganglia arise independently of the ventral chain, and is afterwards connected with it. The entire nervous system and, as far as could be observed, also the commissures arise directly from the ectoderm. The antennæ are developed from the head plate (procephalic lobes) and are situated in front of the other appendages. A pair of cephalic appendages previously observed by Bütschli, which only appear for a short time in front of the mandibles, soon disappear. Grassi considers them as homologous to the second antennæ of Crustacea. He found abdominal appendages only exceptionally, and not on all the segments. The observations of Grassi on the mode of development of the heart agree well with those of Korotneff on Gryllotalpa; both uphold the hypothesis of Bütschli of the origin of the vascular system from the residue of the segmentation-cavity, *i. e.*, the primitive body-cavity. The sexual organs originate as two mesodermal elongated streaks in the 4th–8th abdominal segments.

The tracheæ arise very early; there are ten pairs of stigma present, the 1st thoracic and the two last abdominal segments wanting the same. In the corresponding place of the two last segments appear the germs of the malpighian tubes, which as soon as the hind-intestine is formed extend and open into it. Tracheæ and urinary tubes should be regarded, as P. Mayer supposed, as homodynamic organs. This opinion is also supported by the results of Tichomeroff's researches on the silk-worm; the latter found nine pairs of stigmata, but three pairs of malpighian tubes. Grassi further supposes that the silk glands and other invaginations or "head-canals" found by him near the mandibles and maxillæ are homologous with the tracheæ.

In case an entodermal origin for the antennal glands of the Crustacea and the segmental organs (schleifenkanali) of annelids becomes proved, then the first might be the homologues of the

head-canals of the bee-embryo, and both the tracheæ and malpighian tubes be proved homologous with the nephridia of the annelids.

From such a view Emery dissents: he thinks the relation of these organs in Peripatus are not consistent, since in that animal occur both nephridia and trachea, unless we suppose that the tracheæ of Peripatus and of the other arthropods are not equivalent. If one accepts the fact that the tracheæ and the malpighian tubes have originated from diffusely distributed cutaneous glands, then one could further suppose that their openings unite later with the openings of the nephridia, by which means they assumed a segmental arrangement. But, however, it is not at all necessary to make the nephridia arise from the ectoderm, which would contradict all the researches hitherto made.

LINTNER'S SECOND REPORT AS STATE ENTOMOLOGIST OF NEW YORK.—This forms a volume of 265 pages, representing work done in the years 1882 and 1883. Besides many miscellaneous notes on various local attacks of insects and remedies, certain well-known injurious caterpillars are described at length, as well as noxious flies, beetles, bugs and orthopterous and neuropterous insects.

In the appendix, reprinted from other sources, is described a new sexual character in the pupa of some moths, and an egg parasite of the currant saw-fly is described, while besides is a list of notes of a miscellaneous nature published in various journals, succeeded by a reprint of Fitch's Winter Insects of New York.

The report is rather more miscellaneous and contains perhaps the results of less field work than the first, but still will prove serviceable to the farmers of New York.

The State should be more liberal in affording illustrations for so important and useful a report, those not reproduced being poorly drawn and engraved. This is not the fault of the entomologist, and should not be under the control of the State printers.

ENTOMOLOGICAL NEWS.—At the meeting of the French Academy for Jan. 25, M. J. Chatin read a note on the comparative morphology of the labium in Hymenoptera.——In the Bulletin of the Buffalo Society of Natural Sciences (Vol. v, 1), Dr. D. S. Kellicott describes as new *Nonagria subcarnea*, and compares its larva with that of *Sphida obliquata.*——In the *Canadian Entomologist* for January Mr. Herbert Osborn publishes a useful preliminary list of the species of mites of North America.——In *Entomologica Americana* for March, D. W. Coquillet gives a synopsis, with descriptions of new species, of our species of bombylid flies of the genus Toxophora. Miss M. Murtfeldt shows that certain seed-feeding Coleophora larva, which remain ten or eleven months, and sometimes even longer, in a dormant state,

not feeding in the spring or summer months.——Mr. H. B. Möschler discusses the systematic position of the genus of zygænid moths, Triprocris.——At the meeting of the Washington Entomological Society for Feb. 11, Mr. Schwarz said that among the many forms of secondary sexual characters in the Coleoptera, some would likely be found to be analogous in function to those in the Lepidoptera. He referred more particularly to the tufts of hair in the mentum of Trogosita, and those on the ventral segments of the male of Dermestes. Differences in the vestiture of the sexes are known to occur, *e. g.*, Hoplia, where the male has scales and the females only hairs; but in this case it is hardly possible that we have to do with odoriferous organs.

ZOOLOGY.

Markings of Animals.—Eimer has advanced the view that the markings on animals are primitively longitudinal stripes, which may subsequently be broken up to form dots, and these fuse to form transverse rings. This view is supported by the ontogeny of many animals. Dr. W. Haacke controverts this view from the study of an Australian fish, *Helotes scotus.* The adult fish is marked by eight longitudinal black bands; young specimens have in addition a row of clear transverse bands, which disappear when the fish attains to maturity.—*Journ. Roy. Micr. Soc., February, 1886.*

Blind Crabs.—Mr. J. Wood-Mason states that four species of Brachyura were dredged in the Bay of Bengal from depths exceeding 100 fathoms, during the past season, by H. M.'s Indian marine survey steamer *Investigator.* They belong to the genera Amathia, Ethusa, Eucephaloides (n. gen. allied to Collodes Stimpson) and Lyreidus, of which the last named (*L. channeri*) is especially interesting on account of the rudimentary condition of the eyes.

These organs are unequally reduced, the cornea of the left being of the normal form and extent, but opaque and devoid of all traces of facets, as in Munidopsis, Orophorhynchus, Nephropsis and other blind forms of the deep sea, while that of the right is entirely aborted, its place being only indicated by a small smooth spot marked out by the transparence of a lead-colored pigment similar to that which is seen through the integument around the base of the left eye. This interesting brachyuran, which is at once distinguished from the Japanese and American species by having the anterolateral margin of the carapace armed with two pairs of long and slender spines, were trawled up from a depth of 285–405 fathoms.—*Jour. Roy. Micr. Soc., February, 1886.*

The Intercentrum in Sphenodon (Hatteria).— Professor Cope, in his important note on this point (Am. Nat., Feb., '86)